A Compact, Efficient Pyrolysis/Oxidation System for Solid Waste Resource Recovery in Space, Phase II

Completed Technology Project (2010 - 2013)

Project Introduction

Pyrolysis processing can be used in near term missions for volume reduction, water recovery (drying), stabilization, and enhanced water and oxygen recovery through thermochemical reactions. For longer term missions, the added benefits include production of fuel, multi-purpose carbon, and reactants for in-situ resource utilization (ISRU). The objective of the Phase I SBIR program was to demonstrate the feasibility of integrating pyrolysis, tar cracking, and oxidation steps into a compact, efficient, system for processing spacecraft solid wastes. This integration, which was based on a microwave pyrolysis/cracking/oxidation unit, has resulted in a significant reduction in energy consumption per gram (~70% when compared to a conventional unit), and an overall reduction in system complexity. These improvements should lead to a lower Equivalent System Mass (ESM) for a full scale system. Under Phase II, a prototype microwave pyrolysis/tar cracking/oxidation unit will be developed in collaboration with ETM Electromatic, Inc., a leading manufacturer of microwave power systems for commercial, space and military markets.

Primary U.S. Work Locations and Key Partners

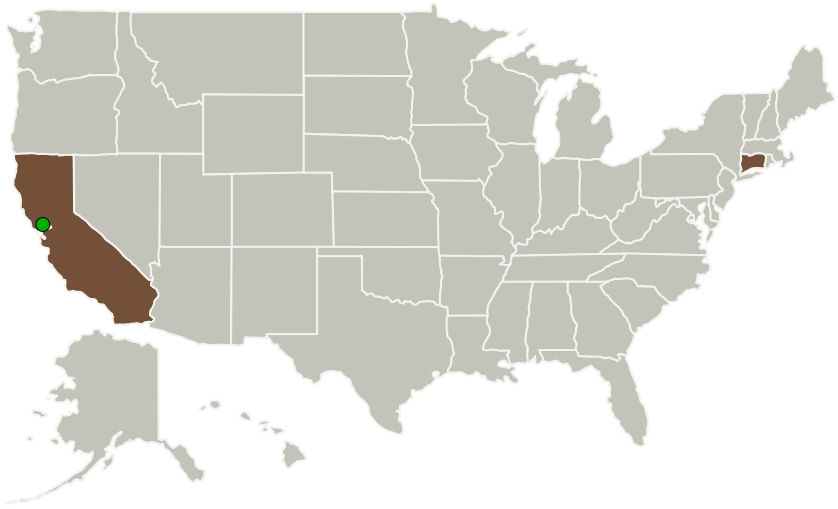

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Table of Contents

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Organizations Performing Work	Role	Type	Location
Advanced Fuel Research, Inc.	Lead Organization	Industry	East Hartford, Connecticut
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Connecticut

Project Transitions

January 2010: Project Start

June 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138720)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Advanced Fuel Research, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

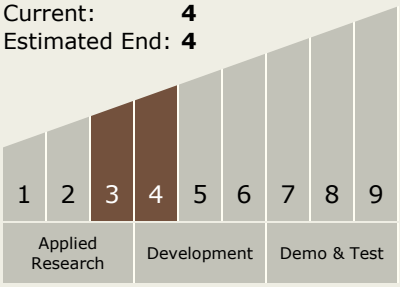
Carlos Torrez

Principal Investigator:

Michael A Serio

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.2 Mission Infrastructure, Sustainability, and Supportability
    - TX07.2.1 Logistics Management

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System